The Excavating Engineer

Vol. 19 JULY 1925 No. 7

Subway Excavation with Air Shovels

The First Subway Job to Be Dug Entirely by Shovels — Description of Patrick McGovern's Contract on Philadelphia's New Broad Street Subway

THE building of Philadelphia's new subway is attracting more than ordinary interest from engineers and contractors not only in this country but abroad.

This unusual interest is due to the bold innovation in construction methods which is being introduced by one of the contractors, Patrick McGovern, Inc. of New York.

Two distinct methods are being employed on this work by the two contractors — the traditional shaft method which has been proved by long experience, and the so-called ramp method, the results of which are being watched with such keen interest. It is with this latter method that we are concerned in this article.

Philadelphia's Rapid Transit Plan

The Broad Street Subway is a part of a rapid transit system laid down and approved by referendum vote in 1923. Engineering and construction are in charge of the Department of City Transit. The plan contemplates a four-track subway from Olney Avenue to the City Hall at Market Street, and from thence in a straight line to League Island, involving an expenditure of about $100,000,000. The present construction plan covers 6¾ miles of four-track subway, of which 25,906 feet is now under construction. This is divided into three sections. The Keystone State Construction Company of Philadelphia are at work on two sections totalling 17,315 feet, all of which, as stated before, is being done by the well-known shaft method. The method of procedure specified was trench excavation under cover. Virtually the entire width of the street from curb to curb is opened, covered and the excavation carried on by shafts — the trench being from 65 to 70 feet wide by 25 to 40 feet deep, which is a large problem in timbering.

McGovern's Contract

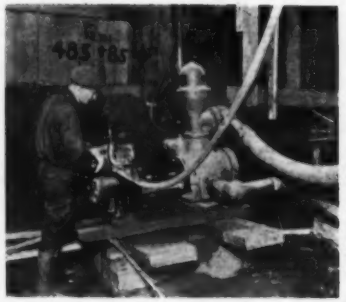
McGovern's Contract No. 106 calls for 8,591 feet, and runs from Clearfield Street, a short distance from the North Philadelphia Station of the Pennsylvania Railroad under the Philadelphia & Reading tracks to Courtland Street. 660,000 cubic yards of excavation are involved.

The method adopted by Mr. McGovern is most original, and it might almost be said, epoch making, as far as subway construction is concerned. His method may be briefly summarized by four essentials, all of which have been used occasionally in subway construction but never before combined into one method for complete operation. These essentials are: 1st, the use of a large number of power shovels in a covered trench; 2nd, the use of ramps instead of shafts, permitting the trucks to enter the cut and serve the shovels directly; 3rd, the opening and covering of three-quarters the width of the street at the first cut and the remainder on the next, thus preventing serious interference with traffic; 4th, the use of truss bracing and platform support across the trench.

How the air shovels moved on the job. Notice that this machine is towing three Ingersoll-Rand compressors which are supplying the air for motive power.

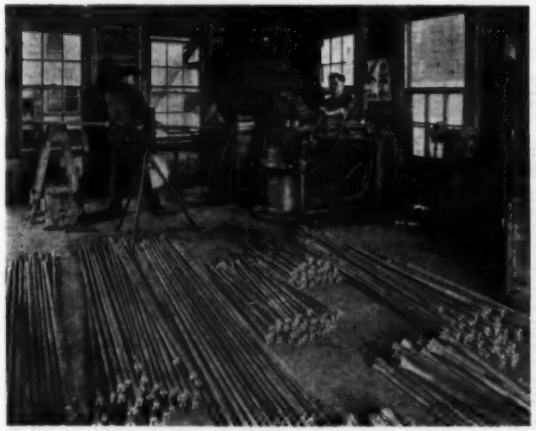
The use of this method is facilitated by the width of Broad Street, it being 75 feet from curb to curb. Underpinning of buildings, consequently, has not been a serious problem.

"Little Tugger" Air Hoist Being Used for Hoisting Large Timbers



One of the Cameron Air-Operated Steam Pumps in Action

Interior of power house on McGovern's contract equipped with Six Chicago Pneumatic Tool Company's air compressors. These compressors furnish 10,000 cubic feet of air per minute at 120 pounds pressure for operating the air shovels, rock drills, clay diggers, etc.



Blacksmith Shop on Patrick McGovern's Contract, Showing an Ingersoll-Rand Sharpener with an Oil Furnace and Various Lengths of Sharpened Steel from 2 to 20 feet long.

One of the air shovels breaking into the pavement on the west side of the street. The east side has already been decked over and excavated.

Showing the Character of Mica Schist Which the Shovels Were Up Against

Views of Construction Operations on Patrick McGovern's Contract on the Philadelphia Subway

Excavation Methods

The street was first opened up by ¾-yard gasoline shovels simultaneously at a large number of different points. The pavement was stripped for 50 feet in width with a shallow cut, deep enough to take care of the decking. The gas shovels were preceded by Ingersoll-Rand portable compressors and pavement breakers. When the air shovels, which are described later, arrived, it was found possible to dispense with the breaking process, as they had sufficient power to break the pavement without preliminary preparation. The decking is then laid on 24-inch I-beam girders, placed by cranes. Nine ramps are being used simultaneously over the entire length of the contract. These are placed at intervals varying from 500 to 1000 feet apart, the distance being governed roughly by the volume of excavation from the section served by each ramp.

Ingersoll-Rand Clay Digger Being Used to Excavate Decomposed Mica Schist Formation

A ramp under construction on the west side of Broad Street immediately after it had been opened up by an air shovel with a high-lift boom. Note how the cross street gas mains are carried across Broad Street.

The ramps are illustrated herewith. They are built on a slope of 14 per cent. The openings are at the middle of the street and offer no obstruction to traffic.

One of the Bucyrus 20-B air shovels being used as a crane with high-lift shovel boom. This machine is shown lifting skips which are loaded by hand underground, by men cleaning up for the concrete.

Virtually, all the excavation in the trench itself is being handled by ¾-yard Bucyrus revolving shovels driven by compressed air. Eight of these machines are in use. The trench is taken with from two to three cuts. The first incline cut is usually handled by an air shovel with a high-lift boom, loading trucks on the street level or on the previous level. The maximum depth of such cuts is about 11 feet. This operation is illustrated in one of our views.

As soon as the 50-foot width has been covered and opened up the same procedure is followed on the remaining 25 feet, the whole street then being decked over. The trench varies in depth from 23 to 38 feet.

Rock is encountered after the first strip cut for the greater part of the contract. This varies in character from a hard granite to a mica schist, most of which requires blasting.

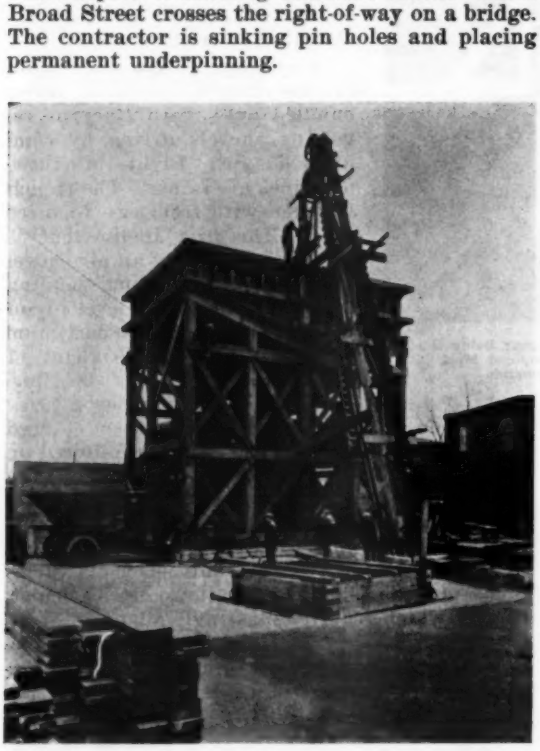
There is no regular procedure, but as a rule, when the rock is covered with overburden, horizontal lifting holes are used at the bottom of the bench. When no overburden occurs, vertical line holes are drilled to grade or to the depth of the steel, namely 14 feet.

Breaking Pavement in the Early Stages of the Work with Ingersoll-Rand Portable Compressor and Pavement Breakers Preparing the Way for Gas Shovels.

A variation of the excavation method must be practiced at the street crossings where pipes and conduits make shovel operation dangerous. There the shovels work as close as possible to the pipes, and the balance of the material is taken out by hand with the help of air spades.

Views of Construction Operations on Patrick McGovern's Contract on the Philadelphia Subway

At one point the subway passes under the Philadelphia & Reading Railroad tracks. There Broad Street crosses the right-of-way on a bridge. The contractor is sinking pin holes and placing permanent underpinning.



Concrete Mixing Plant Under Construction on McGovern's Contract

The first impression an observer gets upon visiting the work is the orderliness of the operations and the spaciousness of the underground workings. Each ramp is in charge of a watchman who directs the passage of the trucks up and down. The timbering bridges the trench with a clear span so that work beneath is unobstructed. The working conditions are excellent.

The work is going forward with surprising speed and regularity. The first air shovels arrived on the work between January 17th and February 10th, and at the time this work was visited, the last week in May, about 50 per cent of the excavation had been completed. The shovels are working two 10-hour shifts, and are served by an average of 65 Mack and White trucks which are operated under a subcontract by Jas. F. Nolen & Sons of Philadelphia. The material is trucked to three dumps with an average haul of a mile and a half.

W. A. Murray, Shovel Maintenance Man and His Gang, at Work Erecting High-Lift Boom on One of the Air Shovels.

Excavating and Crane Equipment

The equipment consists of four Northwest and two P. & H. combination gasoline shovels and cranes, and, as stated, eight Bucyrus ¾-yard air-operated shovels. All the gasoline machines are now being used as cranes for lowering steel and

A Jackhamer Starting 18-foot Holes

for miscellaneous work, such as cleaning up the bottom. Two of the Bucyrus air shovels are also in use as cranes, and the other six are handling the excavation.

The Air Shovels

The Bucyrus air shovels are all mounted on caterpillar traction and equipped with ¾-yard dippers. Four high-lift booms and handles have been supplied for use in open cuts. The short booms are so designed that the shovels may operate in a cut with an overhead clearance of thirteen feet. The machinery is virtually the same as the standard steam shovel except that the boiler is replaced by an air receiver.

Air is taken on the shovels through 3-inch hose for the high-lift shovels and through 2-inch hose when the short booms are in use. This hose in turn taps an 8-inch main running the length of the section.

The Power House

The air for operating the eight shovels, air hammers, drills,

spades and hoists is supplied by a central plant. When work was first started two 14 x 12 Chicago Pneumatic single-belt machines driven by electric motors supplied the air. These were subsequently replaced by six compound electric compressors, 23 — 13 x 16 inches, of the same make. These compressors are furnishing 10,000 cubic

A Group of Jackhamers Drilling 18-foot Holes

feet of air per minute at 120 pounds pressure. These machines are direct connected to 300 h. p. Westinghouse engine-type synchronous motors.

A completely equipped blacksmith shop and a drill sharpening shop are also located near the power house. Concrete for the contract is mixed

An Air Shovel Loading Trucks on the First Cut

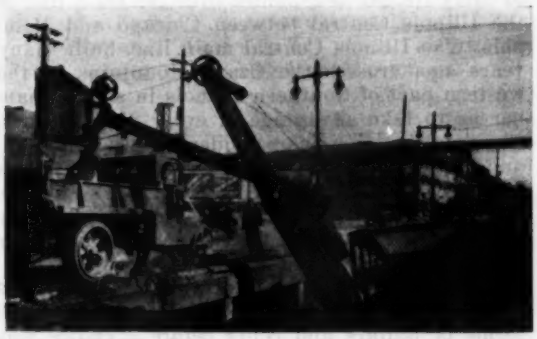
at a central plant located on the Philadelphia & Reading Railway tracks. This plant is illustrated herewith. A 1½-yard Rex mixer is used.

Personnel

The operations are under the direct supervision of Mr. McGovern himself, who is constantly on the work. He may be seen around the job at any time of the night or day. It is to his constant energy and keenness as an executive that may be attributed, in a great measure, his long and splendid records of successful achievement.

J. S. McDonald is his chief engineer; Chas. Kelly, master mechanic and Patrick Porter, general superintendent. The maintenance of the shovel equipment is in the hands of W. A. Murray, who with his assistants devotes his entire time to keeping them in first-class operating condition.

The construction program and the subway design are under the direction of the Department



The 20-B air shovel equipped with a high-lift boom, opening up a cut on the west or unfinished side of Broad Street, the other portion having been decked over and excavated.

of City Transit, of which Henry E. Ehlers is director, Frank R. Fisher, chief engineer, and Chas. H. Stevens, engineer of design. Dion Martinez, Jas. S. Shute and J. L. Dodge are the engineers in direct charge of the construction.

Bucyrus Company Appoints New Northwest Representatives

The Bucyrus Company has announced the appointment of the Clyde Equipment Company of Portland and Seattle as its sales representatives for the Northwest, to handle its entire line in the states of Washington, Oregon and Northern Idaho. The Clyde Equipment Company are well known in the Northwest, being the largest equipment company in this section of the country.

This company will carry at all times in Portland a large supply of spare parts for machines in the field, in order to assure the best and quickest service to customers.

The Portland office is located at 555 Thurman Street, phone Broadway 0885, and the Seattle office at 3410 First Avenue, South, phone Main 1235.

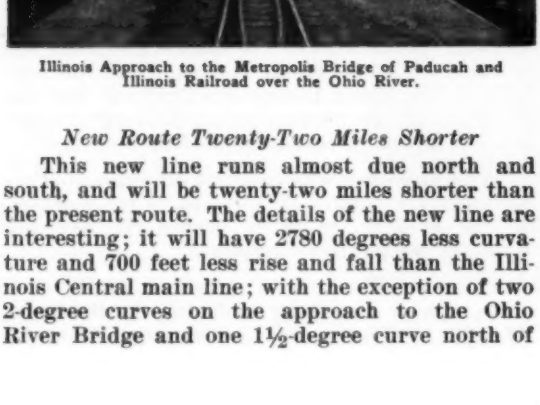
13,000,000 Cu. Yd. Edgewood Cut-Off Well Under Way

Description of Huge Undertaking by Southern Illinois and Kentucky Railroad in Illinois and the Illinois Central Railroad in Kentucky. This is a General Article — Detailed Accounts of the Work on Several Sections Will Appear in an Early Issue of The Excavating Engineer

THE Illinois Central Railroad has been conspicuous in the last few years because of its extensive construction program carried on at a time when railroad construction throughout the country has been almost at a standstill.

Some time ago Illinois Central engineers were called upon by the Southern Illinois and Kentucky Railroad to make a location for a new line to carry freight now hauled over the main line of the Illinois Central between Chicago and Memphis. The Illinois Central main line, built many years ago, crosses the Ozark Mountains in the western part of Southern Illinois in such a manner as to take advantage of every natural pass. The resulting line has considerable rise and fall, and long curves with high rate of curvature. In fact the rate of curvature is as high as 5 degrees in some cases, and the grade as much as 0.75 per cent. These features of the line, objectionable for freight traffic, led to the search for a new location. The engineers made six different locations for the proposed line, and reduced each one to terms of dollars and cents before a choice was made.

The final choice for the Southern Illinois and Kentucky line fell upon a location which leaves the Illinois Central main line at Edgewood, Illinois, crosses the Ohio River at Metropolis, from which point a new Illinois Central line will run into Fulton, Kentucky.



Illinois Approach to the Metropolis Bridge of Paducah and Illinois Railroad over the Ohio River.

New Route Twenty-Two Miles Shorter

This new line runs almost due north and south, and will be twenty-two miles shorter than the present route. The details of the new line are interesting; it will have 2780 degrees less curvature and 700 feet less rise and fall than the Illinois Central main line; with the exception of two 2-degree curves on the approach to the Ohio River Bridge and one 1½-degree curve north of the bridge the maximum rate of curvature on the entire line will be 30 minutes; the maximum gradient will be 0.3 per cent. The line is to be single track, with 100 car sidings approximately every six miles. Leaving Edgewood the new line runs south for 63 miles without a curve; this long tangent runs through Effingham, Clay, Marion, Jefferson, and Franklin Counties; swinging slightly east at Akin the right-of-way traverses parts of Williamson, Saline, Pope, Johnson and Massac Counties. At Metropolis the Southern Illinois and Kentucky line connects with the Paducah and Illinois Railroad and crosses the Ohio River on that company's bridge. This bridge

A Blast on Trapping Operations on A. Guthrie & Company's Section

was built in 1915 in connection with the twelve-mile line built by the Burlington to connect Paducah, Kentucky and Metropolis, Illinois. (This work was described in the June, 1915 issue of *The Excavating Engineer.*)

After crossing the Ohio, the new Illinois Central, running through McCracken, Graves, Hickman and Fulton Counties, joins the main line at the town of Fulton, Kentucky.

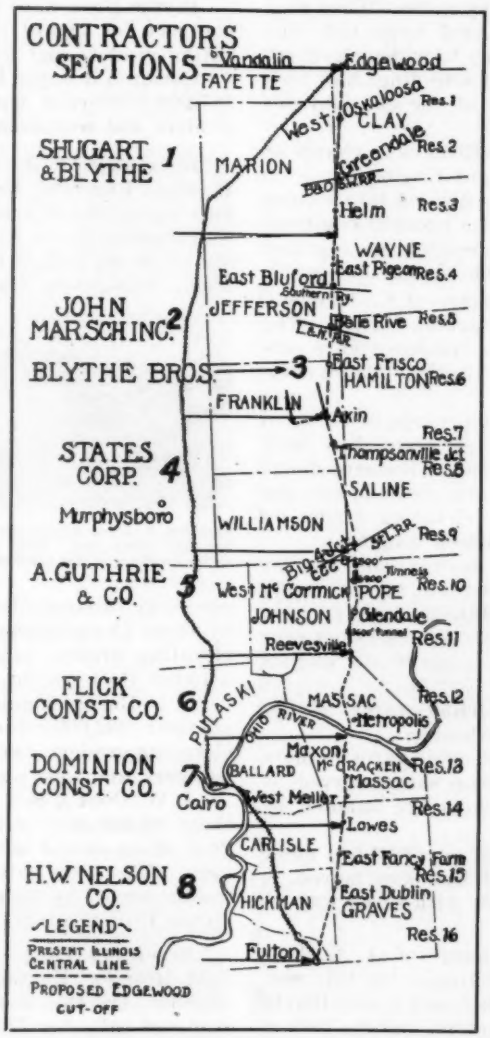
On the Southern Illinois and Kentucky Railroad section there are no grade railroad crossings, although five foreign lines are crossed. The Baltimore and Ohio Southwestern is crossed at Greendale, the Southern at Bluford, the Louisville and Nashville at Belle Rive, the Eldorado Division of the Illinois Central at Thompsonville, and the Big Four at Stonefort, all either over or under grade. On the Illinois Central section, the line crosses the East Cairo Division of the Illinois Central at Maxon, where an interchange track will later be built. Almost all highways crossed will be either above or below grade, the few grade crossings are with unimportant highways that carry very little traffic.

13,000,000 Cubic Yards of Excavation

The Southern Illinois and Kentucky's section of the line is 124 miles in length, while that of the Illinois Central, south of the Ohio River, is 42 miles long. On the section north of the Ohio River a great deal of rock excavation has been encountered through which many deep cuts are being made. On the southern portion of the line the material is mainly clay, with some sand and gravel, and an occasional bit of cemented gravel.

On the northern section there are to be three tunnels of 800 feet, 6900 feet and 2600 feet length. Total excavation will be approximately 13,000,000 yards, and the approximate cost of the finished line about $17,000,000. Cuts are 32 feet on grade, with slopes of 1 to 1, while fills are 20 feet on grade, of natural slope (about 1 to 1½).

The new line runs through a country devoted to farming and fruit growing, and passes through the heart of the southern Illinois coal fields. In the future, as these bituminous coal fields are developed, this line will be an important artery for coal destined for Chicago and other northern points. The Illinois Central main line lies about thirty miles west of this coal field. The Interstate Commerce Commission has passed upon the new cut-off, and held that public necessity and convenience required its building.



Map Showing Location of Edgewood Cut-off, Being Constructed by Southern Illinois and Kentucky Railroad in Illinois North of Ohio River, and by Illinois Central Railroad in Kentucky South of Ohio River.

Work Divided Among Eight Contractors

The construction work on this project was begun last December, and it is estimated that it will take about two years to complete the line. The work is divided into eight sections in each of which the general contractor is as follows:

Section 1 — P. E. Shugart Construction Co. and Blythe Bros., Farina, Illinois, with about 1,400,000 cubic yards to move, mostly common.

Section 2 — John Marsch, Inc., Chicago, with 1,900,000 cubic yards, part rock, part common excavation.

Section 3 — M. L. Windham, Centralia, Illinois, has the excavation for a short branch line, involving about 230,000 cubic yards.

Section 4 — States Corporation, Chicago, has approximately 2,100,000 cubic yards, about half rock, half common.

Section 5—A. Guthrie & Company, St. Paul, has about 2,000,000 cubic yards, mainly rock.

Section 6—Flick Construction Co., Chicago, has about 550,000 cubic yards common excavation.

Section 7 — Dominion Construction Co., Niles, Michigan, has about 2,100,000 cubic yards common.

Section 8—H. W. Nelson Company, Chicago, about 2,100,000 cubic yards, mostly clay.

These sections are numbered as from north to south, Sections 7 and 8 lying below the Ohio River.

The work north of the river is in charge of Mr. T. H. Robertson, Assistant Engineer.

Mr. Robertson is responsible for one of the novel features of the work. No soundings were made for this line as experience had proved that these often gave unreliable indications. On this work, therefore, all cuts are started on the surface as if the entire cut was to be in soil and the slope to be one to one. When rock is encountered the slope is changed to ¼ to 1, and the cut is carried down on this slope to bring the width of grade to standard width.

This leaves a berm of varying width above the rock cut; the method helps very materially in balancing cut and fill to the end that the necessity of borrow pits is often eliminated. Moreover, this berm tends to cut down the amount of soil carried into the finished cut by water. When rock is encountered below the level indicated, this method insures against having to widen the earth cut, as would be necessary if soundings had been made and the cross section of the cut laid out without a berm.

The work below the Ohio River is in charge of Mr. F. W. Armstead, Assistant Engineer.

The total length of line is divided into sixteen residencies, each in charge of a resident engineer. We give below a list of these residencies, together with a brief summary of each contractor's work.

Residency No. 1 — In charge of C. J. Woodward, Resident Engineer, Farina, Illinois. The following contractors on this residency have subcontracts under Shugart & Blythe. The excavation is practically all clay.

J. O'Neil has 178,300 cubic yards of earth to move, of which about 50 per cent has been handled. He is using a Bucyrus 20-B steam shovel which is attended by six 4-yard cars and one gas locomotive. He also has an elevating grader on the job which is served by fifteen wagons.

C. C. Barnes Company have a contract for 118,400 yards, 45 per cent complete, and are using two elevating graders and sixteen wagons.

J. Curran with 44,200 cubic yards, 18 per cent complete, has two elevating graders, six wagons and five wheelers.

W. Roberts with 20,000 cubic yards, 27 per cent complete, is using six wheelers.

J. R. Swigart with 110,100 cubic yards to move is using a Bucyrus 50-B steam shovel served by twelve 5-yard dump cars which are handled by two steam dinkeys.

J. Anderson with a contract of 31,000 cubic yards, of which 55 per cent has been moved, is operating an elevating grader with seven wagons and five wheelers.

Residency No. 2 — In charge of A. G. Boa, Resident Engineer, Xenia, Illinois. On this residency P. E. Shugart Construction Co. and Blythe Bros. are the general contractors, and the following contractors have subcontracts. The excavation is clay.

J. Anderson has a contract for 6,070 cubic yards, 55 per cent complete.

McCarty & McCarty have 111,130 cubic yards, 12 per cent complete, and are using one ¾-yard Koehring gas shovel, served by fourteen 1½-yard cars, which are hauled in two trains by two gas locomotives.

P. E. Shugart has a contract for 111,240 cubic yards, 58 per cent complete. They are moving the dirt with two elevating graders and thirty dump wagons.

H. Oglesby have a contract for 17,660 cubic yards, 45 per cent complete, and are using one elevating grader and seven dump wagons.

Blythe Bros. have finished 25 per cent of their contract for 56,940 cubic yards, using two elevating graders and nineteen dump wagons.

Cameron & Joyce have moved 15 per cent of a 187,960-cubic-yard contract with two elevating graders and seventeen dump wagons.

Residency No. 3 — In charge of A. C. Kenny, Resident Engineer, Xenia, Illinois. The following have subcontracts under Shugart & Blythe:

Cameron Joyce Steam Shovel Company have moved 50 per cent of their 152,000-cubic-yard contract, using one Bucyrus 50-B steam shovel

Cameron & Joyce Steam Shovel Company's 50-B Bucyrus loading five-yard dump cars. Note trimming operations on slope — all slopes on the new line are hand trimmed.

served by thirty-six 5-yard cars, which are hauled by three 18-ton dinkeys. They are also using an elevating grader, nine dump wagons hauled by a 10-ton Holt tractor, and one spreader.

C. C. Barnes & Son have completed 14 per cent of their 202,000-cubic-yard contract, using two elevating graders, twenty-one wagons, four fresno scrapers, and four plows.

J. W. Peed & Son have finished 22 per cent of their 206,000-cubic-yard contract, using a Bucyrus 20-B steam shovel served by twenty-four 1½-yard cars. They are also operating an elevating grader served by eighteen dump wagons and two 10-ton Holt tractors.

Residency No. 4 — In charge of W. D. Shemfield, Resident Engineer, R. F. D. No. 2, Bluford, Illinois. On this residency John Marsch, Inc.'s contract calls for 771,030 cubic yards of excavation which is 20 per cent complete. Practically all the excavation on this residency is clay, although some rock is encountered close to grade. He is using one Bucyrus 78-C railroad-type shovel equipped with a 2½-yard bucket and mounted on caterpillars, and one Bucyrus 20-B ¾-yard shovel, also caterpillar mounted. These shovels are served by forty-five 4-yard Western dump cars, the motive power being furnished by three narrow gauge locomotives. John Marsch is also operating one elevating grader, sixteen dump

wagons, eight wheelers, twenty-seven slips and eleven fresnos. On this residency a 2,000-car yard is to be built.

Residency No. 5 — In charge of J. W. Apperson, Resident Engineer, Belle Rive, Illinois. On this residency John Marsch, Inc.'s contract calls for 227,000 cubic yards, which is 60 per cent complete. The material is mostly common, although some rock is encountered close to grade. He is using a Bucyrus 50-B steam shovel on caterpillars

John Marsch, Inc.'s Bucyrus 50-B Steam Shovel on Residency No. 5.

and a Bucyrus 78-C railroad-type shovel, also caterpillar mounted. These shovels are served by 12-yard Western cars, which are hauled by three standard gauge locomotives. On this residency G. L. Roberts has a subcontract for 77,000 cubic yards, which is 60 per cent complete.

Residency No. 6 — In charge of L. Day, Resident Engineer, Box 105, Benton, Illinois. Excavation on this residency is chiefly clay with some rock.

W. H. Peed, subcontractor under John Marsch, Inc., has a contract for 67,800 cubic

A Bucyrus 78-C on John Marsch, Inc.'s Job, Residency No. 6.

yards, 65 per cent complete. He has on the job an elevating grader, twelve wagons and eighteen teams.

J. B. Dorris, subcontractor, has moved 40 per cent of his 82,100-cubic-yard contract, using two elevating graders, twelve wagons and thirty teams.

John Marsch, Inc., on this residency has moved 15 per cent of the 551,700 cubic yards which his own outfit is handling. This excavation is being done by a Bucyrus 78-C steam shovel served by forty-five Western 5-yard cars, hauled by three 18-ton locomotives.

Residency No. 7 — In charge of F. G. Heil, Resident Engineer, Thompsonville, Illinois. M. L. Windham, general contractor on this residency, is using a Bucyrus 70-C steam shovel served by twenty-nine 12-yard cars and three standard-gauge locomotives, and has moved 4 per cent of the 123,000 cubic yards he has to move. The excavation here is practically all clay.

Residency No. 8 — In charge of F. G. Heil, Resident Engineer, Thompsonville, Illinois. On this residency the excavation runs about 50 per cent rock and 50 per cent common. States Corporation is the general contractor, and their own outfits have moved 30 per cent of the 663,300 cubic yards that they have nosed into. They are using one Bucyrus 103-C steam shovel on caterpillars, a Bucyrus 50-B, caterpillar mounted. The Bucyrus 103-C is served by thirty-six 12-yard standard gauge cars hauled by four standard gauge locomotives. The 50-B is served by twenty 4-yard cars and three narrow gauge locomotives. They also have sixty-five teams on the job.

Dumping a Train of Westerns at a Fill on John Marsch, Inc.'s Job.

Heylman & Rogers, subcontractors under States Corporation, have 334,200 cubic yards to move, and are using a Marion Model 31 steam shovel served by twenty-four 4-yard cars and two steam dinkeys.

Shugart & Blythe, also subbing under States Corporation, have moved 50 per cent of their 108,700-cubic-yard contract with two elevating graders, six teams and one tractor.

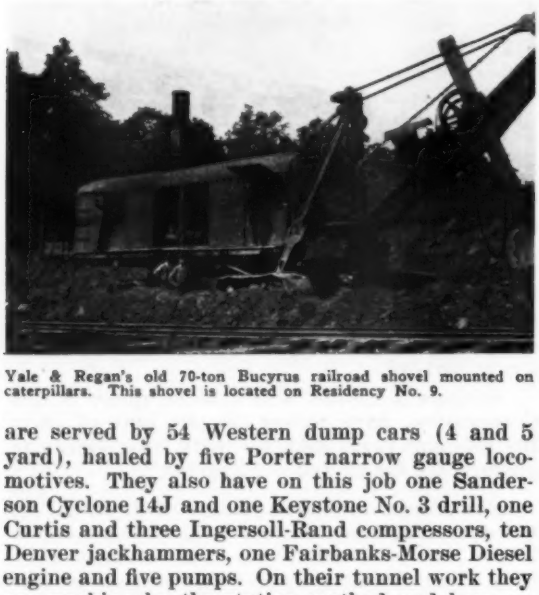
Residency No. 9 — In charge of J. M. Tilley, Resident Engineer, Marion, Illinois. Excavation 50 per cent rock and 50 per cent common. Subbing under States Corporation, the general contractors, are Yale & Regan with 610,800 cubic yards, 11 per cent complete. They are using on this job a Bucyrus 70-C steam shovel and a one-yard Northwest gas shovel. These shovels are served by thirty-two 4-yard cars, the motive power for which is furnished by two Baldwin steam locomotives and two Whitcomb gas locomotives.

Woods Bros., subbing under States Corporation, have 11 per cent of their 576,700-cubic-yard contract completed. They are using a Bucyrus 88-C steam shovel caterpillar mounted, which is served by eighteen 8-yard Continental dump cars hauled by four steam dinkeys.

The work on this residency will be described in detail in a future issue of *The Excavating Engineer.*

Residency No. 10 — In charge of J. W. Swartz, Ozark, Illinois. On this residency there are two tunnels which are being driven through a solid limestone formation. The excavation other than tunnelling on this residency is chiefly rock, which comes very close to the surface at this point.

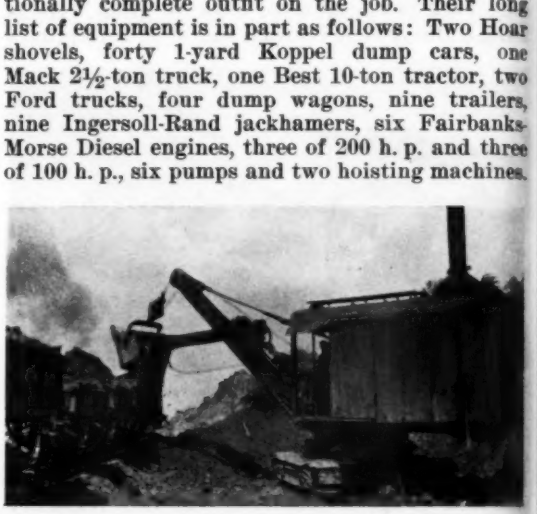
A. Guthrie & Company is the general contractor on this residency. Grant Smith & Co. have a subcontract for 716,000 cubic yards of cut and fill excavation which is 10 per cent complete, and have also a contract for an 800-foot tunnel which will involve the excavation of 12,832 cubic yards of solid rock. Work is being started on the tunnel at the present time. This company is operating a Model 60 Marion and a Bucyrus 18-B steam machine mounted on caterpillars. These shovels



Yale & Regan's old 70-ton Bucyrus railroad shovel mounted on caterpillars. This shovel is located on Residency No. 9.

are served by 54 Western dump cars (4 and 5 yard), hauled by five Porter narrow gauge locomotives. They also have on this job one Sanderson Cyclone 14J and one Keystone No. 3 drill, one Curtis and three Ingersoll-Rand compressors, ten Denver jackhammers, one Fairbanks-Morse Diesel engine and five pumps. On their tunnel work they are working by the station method and have on the job ten 1-yard station man cars.

A. Guthrie & Company have a 6,900-foot tunnel on this residency which involves 110,648 cubic yards of excavation, all in rock. About 1 per cent of the material has been moved. The tunnel cross-section is 18 feet wide and has 17-foot vertical side walls, with a circular roof 9 feet in diameter, making the total height 26 feet. The tunnel floor lies 240 feet below ground level at certain points. At the present time a shaft has been sunk near the center of the tunnel through a distance of about 210 feet. From this shaft a heading 10 feet by 10 feet is being driven in each direction, and work is also being carried on at the approaches. The Guthrie organization has an exceptionally complete outfit on the job. Their long list of equipment is in part as follows: Two Hoar shovels, forty 1-yard Koppel dump cars, one Mack 2½-ton truck, one Best 10-ton tractor, two Ford trucks, four dump wagons, nine trailers, nine Ingersoll-Rand jackhamers, six Fairbanks-Morse Diesel engines, three of 200 h. p. and three of 100 h. p., six pumps and two hoisting machines.



18-B Bucyrus Steam Shovel on Grant Smith & Company's Subcontract under A. Guthrie & Company, Loading Four-Yard Western Dump Cars.

McGregor & Company have a subcontract under Guthrie & Company for 394,000 cubic yards, of which 2 per cent has been moved. They are using on the job a Model 125 Marion shovel, served by forty-eight 4-yard dump cars and four narrow gauge Porter locomotives. They also have on the job five jackhammer drills, five Sanderson-Cyclone drills, three air compressors, one spreader and one pump and five 1-yard station man cars.

Also subbing under A. Guthrie & Company, O'Reilly Bros. have a contract for 70,000 cubic yards, 15 per cent complete, and are doing the work with a Model 36 Marion, twenty-four 4-yard cars, two narrow gauge Porter locomotives, one Sanderson-Cyclone drill, two jackhammers, two Ingersoll-Rand air compressors and a pump.

Residency No. 11 — In charge of P. R. Henderson, Resident Engineer, Grantsburg, Illinois. Excavation on this section mainly rock. A. Guthrie & Co. general contractors.

McGregor & Company has a subcontract for 217,337 cubic yards, on which work will be started in the near future. At the time this is written they have no equipment on the job.

R. S. Morrow & Son have completed about 10 per cent of their contract for 361,480 cubic yards, on which job they have one 1¾-yard Marion shovel and twenty 5-yard dump cars and two gas locomotives. They also have a tunnel 2600 feet long involving 41,696 cubic yards of solid rock excavation.

Waugh Bros., subbing under Guthrie & Company, have completed 14 per cent of their 379,204-cubic-yard contract. They are using two 1¼-yard Osgood shovels and 4-yard dump cars hauled by five steam dinkeys.

Residency No. 12 — In charge of S. P. Critz, Resident Engineer, Metropolis, Illinois. On this residency Flick Construction Company, the general contractors, have finished 22 per cent of the 527,000 yards on which their outfits are actively at work. They are operating two Bucyrus 70-C railroad-type shovels equipped with 2¼-yard dippers. Serving these shovels are forty-two 12-yard

A Fill on Dominion Construction Company's Job.

cars which are hauled by four 50-ton standard gauge steam locomotives.

Gist Bros., subbing under Flick Construction Co., have completed 75 per cent of their 43,000-cubic-yard contract. They are operating a 20-B Bucyrus, and the shovel is being served by twelve 1½-yard dump wagons.

Residency No. 13 — In charge of G. C. Harris, Resident Engineer, Massac, Kentucky. This residency extends from the Ohio River to Mayfield Creek. The Dominion Construction Company is the general contractor on this residency.

J. A. Schaefer have a subcontract under Dominion Construction Company with about 450,000 cubic yards of earth to move, extending over a distance of five miles. They are operating a 1-yard and a 1¼-yard Erie shovel, and are erecting a Model 32 Marion. They are serving the shovels with trains made up of nine and ten 2-yard cars hauled by Whitcomb locomotives, of which they have five on the job. They are also using trains of nine to ten 4-yard cars, hauled by Plymouth locomotives, of which they have three on the job.

Subbing under Schaefer are William Bros., who have 48,000 cubic yards to move. They are using a ¾-yard Erie and wagons.

Subbing directly under Dominion is A. F. Hartigan who has moved 15 per cent of his 340,000 cubic yards. He is using a 1½-yard Erie served by twenty 4-yard cars hauled by steam dinkeys.

Also subbing under Dominion is the Brooks Construction Company operating a Bucyrus 50-B steam shovel with a 1¾-yard dipper, and serving the shovels with forty 6-yard Western dump cars and two standard gauge dinkeys. They have moved 25 per cent of their 425,000-cubic-yard contract.

Dominion Construction Company have in all three camps, extending over this residency and *Residency No. 14*, which is in charge of Mr. E. M. Richardson, Resident Engineer, Lowes, Kentucky. They are using four Bucyrus 70-C railroad-type shovels and one Model 73 Marion-Osgood. The material is chiefly clay. They are serving their shovels with eighty 12-yard and fifty 4-yard Western dump cars. These cars are handled by eight standard gauge 60-ton locomotives, both Davenport and Brooks, and five steam dinkeys (four Porter 10-ton and one Davenport 20-ton). They also have on the job one 15-ton Industrial crane and two Jordan spreaders. They have moved almost 25 per cent of their 2,100,000 cubic yards. This work will be described in an article in a later issue of *The Excavating Engineer*.

Residency No. 15 — In charge of B. P. Brevard, Resident Engineer, Dublin, Kentucky. H. W. Nelson, general contractor, is operating two

One of H. W. Nelson Company's three Diesel-driven shovels on the second time through a 59-foot cut. The 50-B Bucyrus is loading 5-yard Western cars.

camps on which they have two Bucyrus 50-B Diesel-driven shovels, equipped with 1¾-yard dippers. The shovels are served with 5-yard Western dump cars hauled by five Whitcomb and three Milwaukee locomotives. This work will be described in an article in a later issue of *The Excavating Engineer*.

Residency No. 16 — In charge of H. W. Clowe, Resident Engineer, Fulton, Kentucky. H. W. Nelson, general contractor, is operating one camp on this residency. He is using a Bucyrus 50-B Diesel-driven shovel, which is being served by thirty-two 5-yard heavy-duty narrow gauge Western dump cars hauled by one 10-ton Milwaukee locomotive and three 12-ton Whitcomb locomotives. H. W. Nelson has moved about 18 per cent of his 2,100,000 cubic yards. This work will be described in an article in a later issue of *The Excavating Engineer*.

A View of the Metropolis Bridge Across the Ohio River Taken from the Illinois Shore.

Digging Snow Drifts in June with Revolving Shovel

The Rocky Mountain National Park Opens Up Fall River Highway with a ¾-Yard Revolving Shovel

ONE of Colorado's most famous scenic highways, known as the Fall River Road, runs through Milner Pass, between Estes Park and Grand Lake, Colorado, in the Rocky Mountain National Park. At this point it has an altitude of 11,797 feet above sea level.

Every year the snow drifts into this road to such an extent that many weeks of hard labor are required to open the pass for tourist traffic. For several years Roger W. Toll, Superintendent of the Rocky Mountain National Park, has made careful study as to the proper equipment to be used for this work. Various schemes have been suggested, tried out and rejected. It was finally decided that no method of snow removal could be done with the speed approaching that of the steam shovel, or at a cost that was sufficiently below shovel operation to warrant its adoption. The shovel, furthermore, had the additional advantage of being used in the summer for road maintenance and construction in the park. Consequently, an order was placed the latter part of April for a Bucyrus 20-B oil-burning steam shovel. This shovel was equipped with a ¾-yard rock dipper for service in heavy rock later in the season.

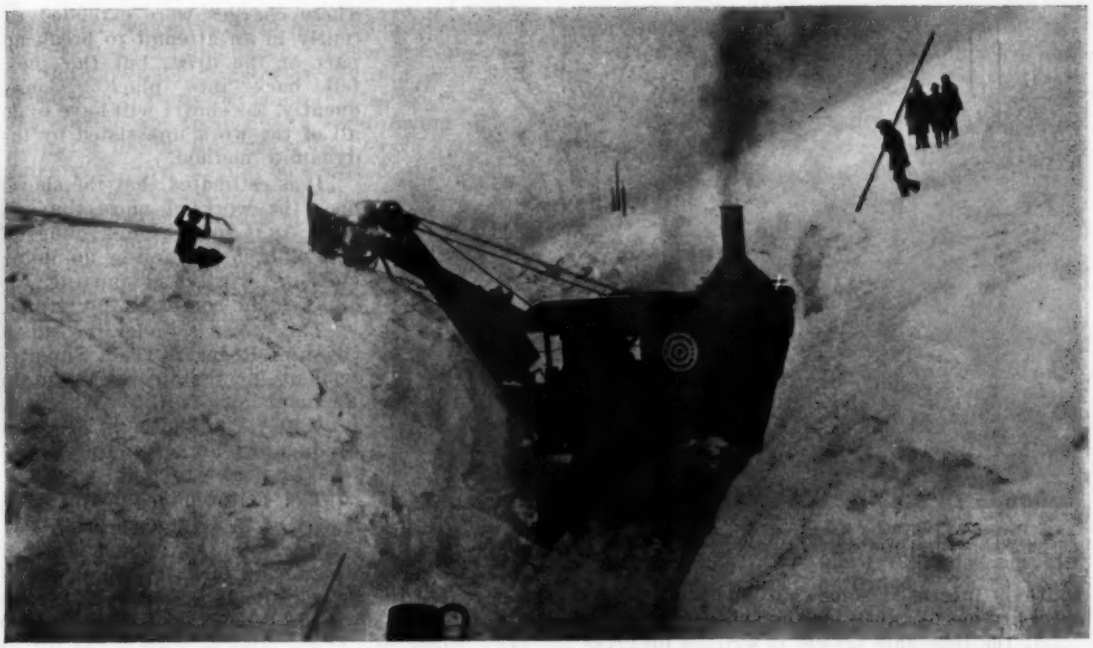
At the same time the park authorities placed an order with a Salt Lake firm for a special, oversize light snow dipper. At the time this article is written this dipper has not been delivered, and the shovel is heading its way through the drifts with the smaller heavy dipper. This, of course, is delaying the work somewhat.

The contract between Rocky Mountain National Park and the Rocky Mountain Parks Transportation Company calls for the opening of the pass by 9:00 a. m., June 15th. Heretofore from 75 to 200 men have been used to open the pass by hand shoveling. By this method it required from four to six weeks to do the work. This season the snow is 20 feet deep at what is presumed to be the deepest point. The main drift is approximately 1500 feet long. The extent of this drift is graphically shown by the small crosses on one of the accompanying photographs.

The shovel was shipped to Lyons, Colorado, which is 23 miles from the town of Estes Park. From Estes Park to the place where the shovel is operating is a distance of 18 miles, making a total of 41 miles over which the shovel had to be transported before it got to the work. It was decided that the best method of transporting the shovel was to knock it down and truck it to the nearest possible point to the job. The contract for the haulage of the shovel was given to the Rocky Mountain Parks Transportation Company.

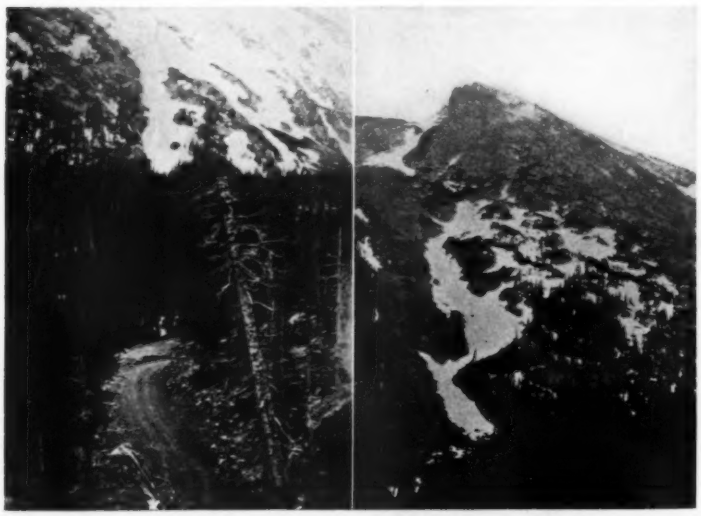
The shovel was dismantled in about two days. It was knocked down so that the heaviest load was 7 tons, this being the revolving frame and the main engines. Further reduction was found unnecessary. Five-ton trucks did the hauling. The erection was done without crane facilities. But with the assistance of Jack Taylor, shovel engineer, Gene Lawson, fireman, and an efficient crew, E. H. Welker, Bucyrus erector, did the job in the record time of 22 hours.

The road through the drift is ordinarily made with sufficient width for one car. This year this



Bucyrus 20-B Digging a 20-foot Drift on the Fall River Road, Milner Pass, Rocky Mountain National Park.

Milner Pass from Fall River Road. The arrow indicates the smoke of the shovel which can barely be seen against the snow. The drift is indicated by the two crosses on the mountain side.



A Portion of Fall River Road Over Which Shovel Was Shipped

Scene Near Milner Pass

width is increased somewhat on account of the necessity of clearance for the shovel.

At the time this article is written progress is being made at the rate of about 100 feet per day. This is through the deepest part of the drift, which is more than 500 feet long. With this part of the drift cleared away the balance of the work will go along rapidly, and it is expected the road will be open long before the 15th of June, which, as stated above, is the contract date.

Last fall before it was determined to purchase a shovel for this work, dynamite was placed along the road and left to be touched off in the spring. These charges were exploded recently in an attempt to break up part of the drift, but the snow fell back into place. Consequently, the shovel will have to do all of the work unassisted by the dynamite method.

It is estimated that the shovel does the work of more than 75 men. As it goes through, gangs of men with shovels follow up, doing clean-up work and putting the highway in condition for traffic.

This work is under the supervision of Roger W. Toll, Superintendent for the Rocky Mountain National Park, with G. W. Camp, foreman. The shovel is operated by Jack Taylor, as engineer, and E. W. Lawson, fireman.

The maintenance work is in charge of R. V. McQuerry.

When the shovel has finished its unusual task, it will, as stated before, be used for maintenance work, and for the construction of several new roads which have been projected. It will also be used in the future for widening the present Fall River Road.

It may be of interest to our readers to know that at the time our photographs were taken a representative of the Pathe News took a series of motion pictures which it is planned to show throughout the heat belts of the East and Middle West during this summer, in order to make the movie fans yearn for the cool airs and climes of Colorado. So if you are suffering from heat, watch for this picture.

Left to right: Roy Atchison, H. N. Steinbarger Co., Denver; G. W. Camp, Foreman; Roger W. Toll, Superintendent, Rocky Mountain National Park; Jack Taylor, Shovel Operator; H. H. Hoddle, H. N. Steinbarger Co.; E. W. Lawson, Fireman (on shovel).

The Pennsylvania's Canton-Bayard Cut-off

The Pennsylvania Railroad's new 15-mile double-track freight cut-off between Canton, Ohio, on its eastern division and Bayard, Ohio, on its Cleveland and Pittsburgh divisions, is now well under way. This work calls for 2,252,000 cubic yards of grading and 15,900 cubic yards of excavation for masonry.

Section 1 from Bayard, Ohio, four miles west, is being handled by A. Guthrie & Company, Incorporated, 608 South Dearborn Street, Chicago. This calls for 450,000 cubic yards of earth and rock which is being handled by Marion Model 125, 36 and 31 shovels. Work was started on April 14th. Guthrie's field headquarters is at Minerva, Ohio. The work is in charge of B. C. Crooks, general superintendent.

Section 2 and Section 4 are both being handled by Ferguson & Edmondson, Keystone Building, Pittsburgh, Pennsylvania. Section 4 was origi-

nally awarded to Mr. M. J. McMenamin of Philadelphia but was given up by him and later awarded to Ferguson & Edmondson. These sections call for 800,000 cubic yards of excavation, and about 14,000 cubic yards of concrete masonry. Work was started on April 4 with seven steam shovel outfits: a 70-Ton Bucyrus with 12-yard standard gauge cars; two Marion 60's with 36-inch 4-yard cars; 3 Eries; one Model 21 Marion; two elevating graders and team outfits and four concrete outfits. Field headquarters of Section 2 is at R. F. D. No. 2, Paris, Stark County, Ohio. The steam shovel operations are in charge of T. H. Finnie, Superintendent. The headquarters of Section 4 is at Louisville, Ohio. O. A. Rogers is superintendent of the shovel and team operations.

Section 3 is being handled by the John F. Casey Company of Pittsburgh. This amounts to $1,250,000 and calls for 1,056,000 cubic yards of unclassified excavation, 10,000 cubic yards of concrete and structures, and six under and over grade crossings. Work was started on May 1st, using a Marion 60, Marion 36, Atlantic 45, Erie, and Bucyrus 50-B shovels. The Bucyrus shovel was purchased new for the work. Field headquarters are at East Canton, Ohio. Work is in charge of S. L. Fuller, vice-president, with Walter Walsh, superintendent on the job.

The Excavating Engineer

A Monthly Publication Devoted to Excavating and Allied Subjects

REGULAR SUBSCRIPTION:
$1.00 per year for 12 numbers.

SPECIAL SUBSCRIPTION:
Upon application on card inserted in this number, subscriber's name will be placed on Rotating List, whereby he will receive The Excavating Engineer frequently (not regularly) free of charge.

THE
EXCAVATING ENGINEER PUBLISHING CO.
Bradlee Van Brunt, Manager and Editor
South Milwaukee, Wisconsin

Printed in the U. S. A.

Prospective Railroad Construction

All indications point to a continued pick-up in railroad construction activities as may be seen from the following reports which are well authenticated. These are but a few of the projects now contemplated.

The Louisville and Nashville are at work on plans to connect up the Clinchfield Railroad. About 140 miles of new line, it is stated, will be built in the mountains of Kentucky and Virginia in a very rough country. When this work is completed the Louisville and Nashville, the Clinchfield and the Atlantic Coast Lines will be connected into a continuous through route. Engineering investigations have shown that the work will be exceedingly expensive. One section covered by a preliminary survey would cost $362,000 a mile. The Louisville and Nashville has applied for extension in time until December 31st to present its plans and make further surveys for the purpose of discovering a route which will not be so excessively expensive.

The Denver and Rio Grande Western Railroad has applied for a commission from the Interstate Commerce Commission to build a 130-mile branch northeast from Soldier Summit to Vernal, Utah, in order to develop rich mineral resources and agricultural possibilities. The cost is estimated at about seven million dollars.

The Salt Lake and Denver Railroad has also applied to build a line from Provo, Utah, eastward about 250 miles to the present terminal of the Denver and Salt Lake Railroad at Craig, Colorado.

The Great Northern Railway is planning a 50-mile extension of its present branch running from Bainville to Scobey, Montana. This branch will be extended from Scobey to Ophiem and Glentana. The cost will be about $1,500,000.

The Santa Fe has engineers in the field making survey for a proposed extension from Seagraves to Carlsbad, New Mexico, about 115 miles, with the ultimate purpose of extending southwest to El Paso about 125 miles.

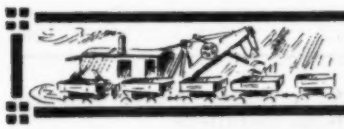
It is reported that as soon as the merger of the San Antonio, Uvalde and Gulf Railroad with the Missouri Pacific is accomplished a 45-mile line will be built between Fowlerton and Three Rivers, Texas, and another 50 miles from Crystal City to Eagle Pass. This will give the Missouri Pacific a new through route to the Rio Grande gateway, where connection will be made into Mexico.

The Quebec Extension Railway has obtained authority to construct a new line from Washburn on the Canadian border 112 miles into the state of Maine. It is provided that construction be commenced by September 1st of this year and be completed by December 31, 1927.

Oiling Macadam

During 1922 a total of 3,158,187 square yards of macadam were oiled by the Public Works Department of Boston, Massachusetts.

The average cost, according to the 1922 annual report of the department, was $.0125 per square yard covered once. An average of 0.158 gallons of oil was used per square yard.



SHOTS FROM THE · FIRING LINE ·

Illinois Notes

BY D. L. MERCKEL AND J. J. GAULT

W. J. Newman's 18-B and 20-B Bucyrus shovels are busy excavating a considerable yardage on the grounds of the new Northwestern University campus near Chicago Avenue and Fairbanks Court. Jim Casey, veteran runner for this company, says "the machines are ever hungry for more material."

Additional sections of the South Water Street improvement have been recently let to the Mid-Continent Construction Company. This old, congested river frontage will soon appear as a fully over-decked concrete boulevard.

Sections B and C of sanitary and intercepting sewer were let to Jno. E. Bretz Construction Company, 220 East Union Street, Springfield. $77,941 and $387,534 respectively.

Flick Construction Company, 133 West Washington Street, Chicago, were awarded contract on 19 miles, second main line between Latimer and Dwight, for the Chicago, Rock Island & Pacific Railroad.

Missouri Notes

BY W. G. PARROTTE

Bill Hayes has a new 30-B Bucyrus dragline on his city water job in St. Louis.

Winston Hill Construction Company are operating a 70-C Bucyrus and an Osgood 29 on their Missouri-Pacific second contract.

Carmichael-Cryder Construction Co. of St. Louis have a new Bucyrus 20-B working with their 50-B on their Wabash yards contract in North Kansas City.

C. T. Fogle Construction Co. of Jefferson City have started work on their new bridge job at Branson, Mo.

Guy M. Harmon writes that he is at present craning a 70-ton Bucyrus shovel at Independence, Missouri. Uncle Sam delivers his mail at Olney, Illinois.

New England Notes

BY J. W. BISHOP

The Aroostook Valley Railway of Northern Maine plan to extend their road 112 miles in that section of the state, thus reaching to the Canadian border. This new line will be known as the Quebec Extension Railway.

Highway construction in all six of the New England States, although somewhat tardy due to the cold weather, is now under full swing. The plans of the various commissions promise the contractors a busy season.

Building contractors, particularly in the vicinity of Boston, were never so busy as at the present time. Every available truck is hauling dirt.

Pacific Coast News

BY P. H. BIRCKHEAD AND J. H. SACKETT

Contract awarded by Santa Fe Railway Co. to Sharp & Fellows, Central Building, Los Angeles, at about $550,000 for 65 miles railroad in Lubbock and Cochran Counties, Texas.

Contract awarded to Farrar & Carlin, 180 Jessie Street, San Francisco, who bid $46,973 for the grading of 11,000 lineal feet of the Pulgas Road, 4 miles west of Redwood City, San Mateo County, 32 feet wide, also culvert, pipe, etc.

Bids were received from the following concerns by the United States Engineer's Office, 401 Custom House, San Francisco, for dredging in the Oakland Harbor: American Dredging Co., 255 California Street, San Francisco, low bidder, $.1744 per yard; United Dredging Co., Oakland, $.197 per yard; San Francisco Bridge Co., San Francisco, $.217 per yard; Western Dredging Co., San Francisco, $.295 per yard; Fred C. Franks Contracting Co., San Francisco, $.2995 per yard. Bids referred to Washington, D. C. Work involves 2,033,340 yards dredging.

Contract awarded by Stanford University to Palmer & McBryde, 503 Market Street, San Francisco, at approximately $200,000 for the excavation and construction of an additional 10,200 wooden seats at Stanford University, and excavation and construction of a new baseball diamond. Shirley Baker, Holbrook Building, 58 Sutter Street, San Francisco, is the engineer.

On the left is Peter Told, fireman, to the right is W. R. Tilbury, engineer, and in the lower right corner is W. E. Dunn, pitman. This crew operates the Bucyrus

50-B Bucyrus Steam Shovel Loading Cars on Bank at Right of Illustration

50-B owned by the Utah Construction Company, which is now stripping gravel for use in the construction of the dam at American Falls, Idaho.

Pittsburgh and Vicinity

BY F. B. SMITH

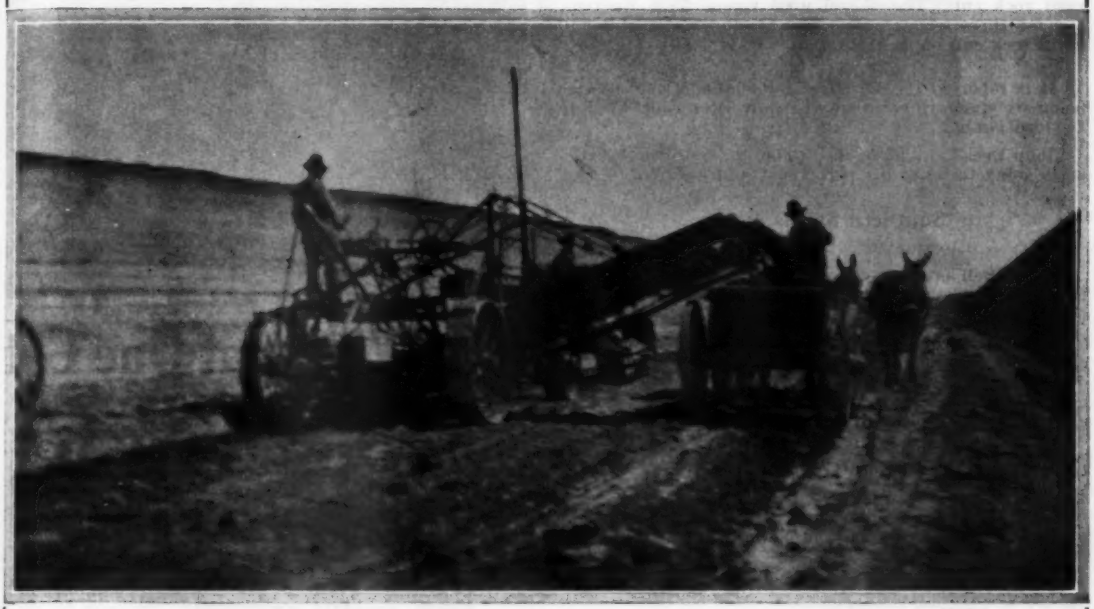
The Dravo Contracting Company, Pittsburgh, Pennsylvania, received contract for the foundation of the new point bridge at Pittsburgh.

Joe Marmarose received a contract for a sewer on West Liberty Avenue, Pittsburgh, on which he is using an Erie B clamshell.

Business in the coal stripping field around Pittsburgh is improving as evidenced by the number of shovels being started. Mr. Walker, superintendent of the Narva Coal Company, reports he is loading out in the neighborhood of 13,000 tons per month.

John Fromm is now working for Charlie Wenner of the Cadiz Block Coal Company.

Install a WESTERN Machine for Making That Cut (1925 Model)



Making a Railroad Cut with Western Elevating Grader Loading Western Dump Wagons. Southern Pacific Contract Work in Texas.

There are jobs, of course, on which a WESTERN Elevating Grader should be used for the sake of economy and time saving. Look at the bank-slopes in the above photographic illustration of some railroad work near Dallas, Texas.

Have you seen the 1925 model WESTERN Elevating Grader? It was superb before, but has been so strengthened that no tractor can pull the frame out of alignment. If a better elevating grader ever is built it will be another "WESTERN." It is as good as we know how to build now, and we have been building elevating graders many years.

Let us tell you all about this improved machine, and refer you to men who are using them. Write today.

Western

That's Why

Western Wheeled Scraper Co.

Founded 1877

Earth and Stone Handling Equipment

Aurora, Illinois

For convenience in making inquiry use postal inserted in this number.

The Ohio River Edison Coal Company purchased a Bucyrus 320-B and a 50-B for their operation at Toronto. This makes the second unit purchased by this company within the past year.

Herb Hawk, the genial superintendent of the Sheesley & Janney Contracting Company, Johnstown, Pennsylvania, will be through in a few months with his 150,000-yard rock cut. The shovel used was a 50-B Bucyrus, and for those who are skeptical about what a 50-B will do in rock call on Herb.

It is reported the Ferguson-Edmondson Company are using six standard railroad-type shovels on their Canton-Baylord cut-off.

John Beck is a visitor in Pittsburgh, and it is reported he is going to make his permanent address here.

Southern States Notes

BY W. W. WHORLEY

J. W. Bell is helping erect a Class-320 electric dragline for the Southern Phosphate Corporation, at Lakeland, Florida.

Bill Welch, one of the Bucyrus Company's erecting engineers, has just finished building a 2½-yard dipper dredge for the Dixie Sand & Gravel Company at Chattanooga. Bill says that the scenery around the mountain city is great.

J. T. Moses, who has been stripping coal in Kentucky for the D. B. Gore Company, was a recent caller at this office.

W. J. McMichael is grading a road near Marbury with a Bucyrus 20-B shovel for the Newell Contracting Company.

Vader Roberts is handling a 20-B Bucyrus for J. B. Turner at Clanton, Alabama.

C. B. Cox of Clanton, Alabama, reports that he has landed another nice job in Florida.

M. E. Kennedy, an old-timer who has been operating on the Central of Georgia work, dropped in to see us recently.

J. D. Morris is handling a Marion M-21 for P. E. Millsaps in Florida.

A. L. Oldacre is now located at Saragossa, Alabama, where he is manager for the Saragossa Mining Company.

St. Louis Items

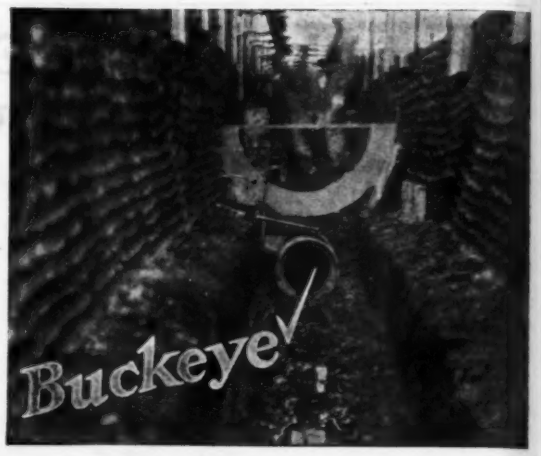
BY A. B. KOENIG

C. T. Klein of the W. D. Lonergan Construction Co. has several outfits at work on Missouri state highways west of here.

J. W. McMurry Contracting Co. were awarded several nice concrete jobs in Missouri and Indiana by the Wabash Railroad Co.

A. J. Gage reports a ¾-yard steam shovel idle that he would like to place on state highway or railroad work, R. F. D. No. 7, Mansfield, Ohio, will catch him.

Emery S. Hill of Winston-Hill is sticking pretty close to his shovel work on the Missouri Pacific Railroad between Kirkwood and Jefferson City, Missouri. Mr. Hill has been doing splendid work, and showing up good estimates during the past month.



Two Widths at One Cut

Two sizes of trench in one operation — ready for two sizes of pipe to be laid immediately.

Excavating costs were reduced by half.

Great range of cutting widths, a wonderful advantage, is only one of the many superior working features of Buckeye Trench Excavators.

There is no "weak link" in Buckeye construction. From power plant to digging chains, Buckeyes are designed and built to give steady, profitable service in all kinds of digging.

The heavy-duty engine develops plenty of power — it always has some in reserve.

The power is profitably used — gears and chains transmit it. No loss due to slippage. Automatic safety device protects against overloads.

Then there's the Quick-Shift Conveyor — the greatest individual improvement on modern trenching machines. It was originally developed and perfected on Buckeyes.

Driven from both ends, this Conveyor has an exceptionally wide belt, which is kept centered by a patented construction. No material too wet, too slippery or too difficult to handle with this Buckeye invention.

Thirty years' successful experience guarantees Buckeye performance.

Ask any owner — or write us for the evidence.

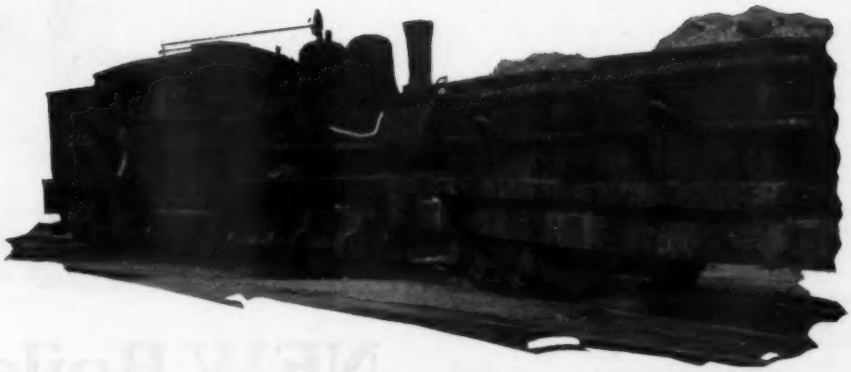
The Buckeye Traction Ditcher Company
Findlay, Ohio

Manufacturers of Trench Excavators (both Wheel and Chain-and-Bucket Types), Pipe Line Trench Excavators, Tile and Open Ditchers, Back-Fillers, Pipe Screwing Machines, Curb Diggers and Clay Diggers

THERE'S A BUCKEYE SALES AND SERVICE OFFICE NEAR YOU

BUILDERS OF TRENCH EXCAVATORS FOR 30 YEARS

For convenience in making inquiry use postal inserted in this number.



Nine Years of Continuous Shay Operation

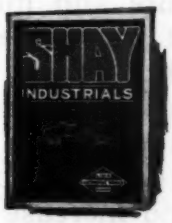
"I've had Shays for nine years," said a Shay owner, "and I can't recall losing a single day for repairs."

Shays are carefully designed and ruggedly built for continuous year-in and year-out operation, such as has been the experience of this Shay owner.

Shay boilers, all built in Lima's shops, fully meet the requirements of the A. S. M. E. code; the most stringent in use today.

All Shay moving parts, such as valve motion, rods, driving shafts and gears, are easily accessible. The ordinary adjustments every locomotive requires are easily made on Shays by the engineers. Drop pits and extensive machine shops are not necessary.

May we tell you, more in detail, why Shays stay on the job steadily for years and years, without time out for repairs?



The Shay Industrial Catalog will tell you what Shays are doing under conditions similar to yours. Write for a copy.

LIMA LOCOMOTIVE WORKS
Incorporated
Lima, Ohio 17 East 42nd St., New York

LIMA
Shay Geared LOCOMOTIVES

For convenience in making inquiry use postal inserted in this number.

E. C. Ferriday, Manager Contractors Section, H. G. Horton, Western representative, and Bob Sinclair of the du Pont Powder Company surprised the writer with a pleasant call the other day. Business is good. Call again soon, boys.

M. H. Slosson, 4257 Pennsylvania Street, Gary, Indiana, reports a 15-team and a ¾-yard shovel outfit idle. He wants a job for them.

Contracts have been awarded to the Kearney Construction Co. of Memphis, for the paving, curbing and guttering of five residential streets of Batesville, Ark.

P. J. Hannan, Pete Hannan and E. K. Hayes of the P. J. Hannan Co. are skirmishing around trying to locate a steam shovel job. They have one idle ready to move on a day's notice.

Gierke & Clelland are finishing their work at Stonefort, Illinois. They are in the market for work suitable for a 15-team outfit.

Wm. Brothers will finish his highway work at Herculaneum, Missouri, shortly. He is looking for work to place 10 teams on.

A. L. Cook was awarded contract for the first hard pavement in Warren, Arkansas. Work is to be completed in 80 working days.

Winston Bros. Co. celebrated their 50th anniversary in the contracting business in Minneapolis, Minnesota, June 1st. Luther Oakes and Bill Rohan left here to attend the celebration. This company is making satisfactory progress on their new Missouri Pacific double-track work between Kirkwood and Jefferson City, Mo.

D. B. Cassell, secretary and assistant treasurer of the Bates & Rogers Construction Co., Chicago, was a visitor in this territory. They have several concrete and construction gangs at work on the new Missouri Pacific Railroad double track between Kirkwood and Jefferson City, Missouri. He made a good start and is going along fine.

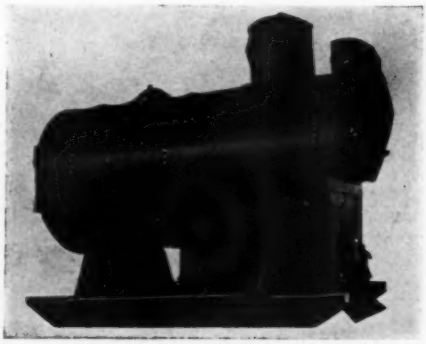
Louis Borcherding of the Public Works Construction Co., 919 Century Building, St. Louis, reports three concrete outfits idle that they would like to place on work immediately.

Stevens Bros., 612 Endicott Building, St. Paul, Minnesota, want a team outfit at Kenderhook, Illinois, on state highway. Three or four months' work.

Arthur J. Koenig, manager of Koenig Labor Agency, St. Louis, while assisting a paperhanger at his home removing old wallpaper had the misfortune to slip and fall off of a ladder. He broke his ankle which will keep him at home for at least thirty days. During his absence old daddy Koenig is back in the harness taking care of the business and shipments of labor.

Lee Van Horn writes from Ilmo, Missouri, that his 12-team outfit is about idle there. He wants some grading.

Contractors when in want of work or labor for their outfits write the old reliable Koenig Labor Agency, 612 Walnut Street, St. Louis, Missouri, or 501 Delaware Street, Kansas City, Missouri.



NEW Boilers for OLD

Check over your equipment. Replace your old boilers with new ones of full capacity, higher pressure and modern design. Cut out expensive repairs and shut-downs. "Pep up" the old machine and let uninterrupted output with increased yardage pay for the new boiler and increase your profit on the job.

JOHNSTON BROS., Inc.

Specializing in Boilers for Contractors' Equipment

FERRYSBURG, MICHIGAN

For convenience in making inquiry use postal inserted in this number.

Double up on time!

SWING more contracts without adding any new machinery! Do this job and move on—quicker! You can, if you let Pyle-O-Lytes throw a stream of daylight onto every man's job, permitting twenty-four hour operation.

These floodlights are very well built, and are the most economical in terms of long life, dependability, and economy of operation. They are easily and quickly installed by anybody.

Pyle-National Turbo-Generators, available in a number of sizes, are the ideal means of supplying power for Pyle-O-Lytes.

Better write for the descriptive booklets now. They'll show you how to double up on time!

A product of The Pyle-National Company, for twenty-eight years the world's largest manufacturer of locomotive headlight equipment.

PYLE NATIONAL COMPANY

TRADE MARK REGISTERED

The Pyle-National Company

General Offices and Works:
1334-1358 North Kostner Ave., Chicago, Ill., U. S. A.
Canadian Agents: The Holden Company, Ltd., Montreal, Winnipeg, Vancouver, Toronto.
Export Department: International Railway Supply Company, 30 Church Street, New York City.

EE-7F-RTG

For convenience in making inquiry use postal inserted in this number.

Texas

Sharp & Fellows of Los Angeles have been awarded a contract by the Santa Fe for a 63-mile extension from Doud, Texas, west through Lubbock, Hockley and Cochran Counties. It is planned to push the work so that the line may be in operation by the fall.

Canada

Montreal and Vicinity

BY J. M. WARD

Quinlan, Robertson & Janin, Limited, secured the contract for the southern portion of the new South Shore Bridge and have started to work. It is expected that this job will take eighteen months.

Cavicchi & Cooke are making good progress on their railroad contract for the Thurso and Nation River Railway. This line is being built by the Singer Manufacturing Company to bring logs to their proposed mill at Thurso.

Toronto and Vicinity

BY C. F. ENGLAND

Dufferin Construction Co., Ltd., have been awarded and have made a good start on the Royce Avenue Subway, Toronto.

The Canadian Dredging Company, Ltd., have started their new 30-B Bucyrus dragline excavator on their contract, New Welland Ship Canal.

McDougal Brothers have started their 70-C Bucyrus on earth excavation, Section 7, New Welland Ship Canal.

Vancouver and Vicinity

BY J. C. MOON

The municipality of South Vancouver are commencing work on a large program of sewer construction, and have purchased a ladder type trenching machine, the operation of which is expected to show a large saving over hand work.

A by-law submitted by the West Vancouver municipality for sanction to extend the Marine Drive to Whycliffe was passed by a large majority, and work will commence on this scheme at an early date. The cost is estimated at about $125,000, about half of which will be met by the Provincial Government. This extension is expected to give a great impetus to motor traffic along the west shore of Burrard Inlet and forms one of the most scenic drives in the West.

TRADE NOTES

The *Little Red Wagon Manufacturing Co.*, Omaha, Nebraska, have recently placed on the market the Lap-Disco Backsloper. It is claimed that this machine, because of its overlapping revolving discs, requires less power to operate than the old-style blade backsloper, or that it will remove 25 per cent more dirt with the same power and will operate in tall weeds and rubbish. For further information write the manufacturer.

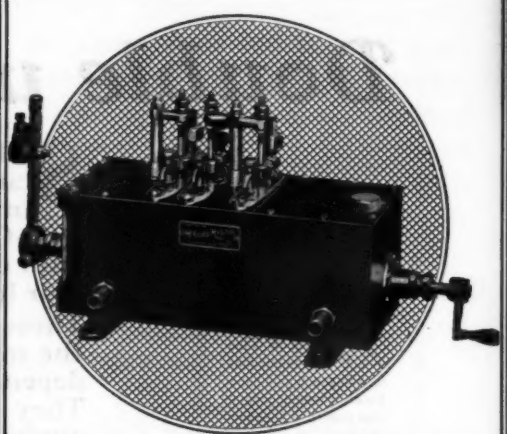
The Clark Car Company of Pittsburgh, Pennsylvania, manufacturers of balanced door dump cars, has appointed the Engineering Products Company, Rialto Building, San Francisco, California, as its Pacific Coast Representative.

A McCord Force Feed Lubricator Will Keep Your Shovel on the Job

A McCord force feed lubricator installed on your steam shovel now will insure more continuous operation. Dependable force feed lubrication prevents shutdowns and delays, it gives more hours on the job.

McCord force feed lubricators are used as standard equipment by the largest and best-known steam shovel builders and they will be installed on any shovel at your request.

Put a McCord lubricator on now and be assured of dependable lubrication for the life of your shovel.



McCord Class B. A. Force Feed Lubricator

McCord Radiator & Mfg. Co.
Detroit, Michigan

McCord
force feed
Lubricators

Extension Side Dump Cars in Coal Stripping Service

EXTENSION SIDE DUMP CARS were selected for this large coal stripping job for two principal reasons: First, because they will stand up day in and day out under the heaviest kind of service conditions; and second, because the down-turning door feature removes all loading restrictions from the shovel.

The material handled consists chiefly of large boulders.

EXTENSION SIDE DUMP CARS pay big dividends in work of this kind.

May we send you full particulars?

CLARK CAR COMPANY

Oliver Building
PITTSBURGH, PA.

NEW YORK OFFICE: 52 Vanderbilt Ave.
SAN FRANCISCO OFFICE: Rialto Building
CHICAGO OFFICE 122 South Michigan Ave.

For convenience in making inquiry use postal inserted in this number.

On Thursday, May 14th, the Holt Manufacturing Company and the C. L. Best Tractor Company ceased operations under their respective names, and their plants and business passed to the *Caterpillar Tractor Company*. All assets of both companies were transferred to the Caterpillar Tractor Company, which assumed the liabilities of the two companies, which was incorporated under the California laws, April 15, 1925. Mr. C. L. Best is chairman of the board and Mr. R. C. Force is president.

The Ingersoll-Rand Company announce a new rivet set for pneumatic hammers to be known as "Jack Set." The manufacturers claim a life of three and four times the length of ordinary sets. It is made of a high-quality alloy steel, specially washed and heat treated. For further information address the *Ingersoll-Rand Company, 11 Broadway, New York.*

Stockland Road Machinery Company of Minneapolis, Minnesota, announce a new utility road grader known as the Greyhound. This machine is equipped with solid rubber tires, and has a number of improvements in design which will doubtless prove of interest to the road builder. For full information and specifications write the *Stockland Road Machinery Company, Minneapolis, Minnesota.*

REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us.

THE CAR FORM — 8½ x 11 inches, 8 pages with cover. Describes and illustrates Lakewood road forms, designed for use with modern subgrade and finishing machinery for concrete road construction. Address *The Lakewood Engineering Company, Cleveland, Ohio*, and ask for BULLETIN No. 45.

SULLIVAN ELECTRIC PORTABLE HOISTS — 6 x 9, eight pages. Describes, gives specifications and illustrates uses for the Sullivan single and double drum electrical portable hoists. For copy write to *Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, Illinois.*

THE SUB-GRADER — 8½ x 11 inches, 10 pages with cover. Describes and illustrates Lakewood steel subgrader with scarifying teeth, and its operation on road forms. Shows also the grade rooter. Address *The Lakewood Engineering Company, Cleveland, Ohio*, and ask for BULLETIN No. 46.

THERE is an interesting story connected with the design and working parts of Madison-Kipp Lubricators. We believe any operator or engine mechanic would find this story instructive as well as interesting.

We have prepared a bulletin which describes the inside mechanism of Madison-Kipp lubricators which we will send to anyone requesting it.

May we mail one to you? Ask for Bulletin No. 50.

Madison-Kipp Corporation

Madison, Wisconsin, U.S.A.

TAYLOR MESABA

STEAM SHOVEL CHAIN

Has proved its ability to give maximum chain service so convincingly that hundreds of operators will specify no other.

The special attention we give to raw materials used is your protection against inferior service.

Taylor Mesaba Steam Shovel Chain is built to stand punishment, made only of the highest type materials and piled in a manner that reduces splitting to a minimum. Like every high-grade product, the final service rendered makes it the most economical in the long run.

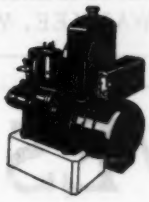
Send for Catalog E.

S. G. Taylor Chain Company

Established 1873

641 Marquette Building, Chicago, Illinois

Speeding the Job with Electric Lights—



A Kohler Electric Plant on the platform of your excavator will speed the job to completion by supplying electric light for night operations. The plant has ample current also to light men's shacks, garages, stables and other buildings.

Its power will operate pumps, air compressor, emery wheels and other tools.

The plant is compact because it is without storage batteries. It is dependable and economical. Current is the standard 110-volt kind.

Our 48-page booklet "The Principle and the Proof" tells more about this unusual plant and of its use by contractors and others in every field. Write for it.

KOHLER OF KOHLER

KOHLER CO., *Founded 1873*, KOHLER, Wis.
Shipping Point, Sheboygan, Wis.

For convenience in making inquiry use postal inserted in this number.

It's What You *Can't See* That Counts

One chain looks much like another.

Important differences in the materials used are invisible — nor can you see how it was treated in manufacture.

Some chains are made by the cheapest methods. Bucyrus Special Hoisting Chain is built to give long-lasting service — the material used — each operation in its manufacture — has been developed to produce the highest grade of steam shovel chain.

And — most important of all — it costs less than other chains because it lasts longer.

Longer Service = { Less Delays / Less Cost / More Profits }

TRY ONE

BUCYRUS COMPANY
SPECIALTY DEPARTMENT
SOUTH MILWAUKEE, WIS., U. S. A.

The "CLIPPER" Blast Hole Drill
New Model

There is a reason why the "CLIPPER" predominates in the blast hole field.

No Cogs in Front End Mechanism

This machine is simple, durable, and easily maintained. It is made for steam, electric, gasoline or air drive. (Also made in Round Wheel.)

Write for Catalog

The Loomis Machine Company
(Established 1842)
K Street, Tiffin, Ohio

SAVES Time, Expensive Repairs, Hauling Charges, and Streets and Pavements

This trailer safely carries a shovel weighing 35 to 40 tons, but costs little more than an ordinary 4-wheel trailer and lasts much longer. Your five-ton truck will haul this load. Let us show you how to save both time and money in moving your equipment.

BUCYRUS COMPANY
Specialty Department South Milwaukee, Wisconsin, U. S. A.

For convenience in making inquiry use postal inserted in this number.

OTHERS MAKE GOOD EXPLOSIVES— OUR CUSTOMERS KNOW THAT

Any manufacturer is in an enviable position who can affirm positively and without any qualification that his products are the best in their line; providing, of course, that people believe him, and that their experience with his products confirms the belief.

But such manufacturers are rare, particularly so in highly competitive fields. And the word "best" has been employed with such uncontrolled enthusiasm that people seldom take it at its face value no matter how truly it may apply to some advertised product. Frankly, we admit that we could not make such a general claim ourselves, in strict justice to others.

Instead, let us say that over a period of years we have developed a series of excellent explosives and blasting supplies which are giving satisfaction on all types of work for which industrial explosives are needed. We are continually trying to improve our products, and shall not knowingly permit them to be excelled.

We concede that we are not the only manufacturer of high quality explosives, but if you decide to use anything made by the Hercules Powder Company, we shall do our best to make you feel that you have chosen wisely.

For a free copy of a comprehensive booklet on *Safety in the Use of Explosives,* or any of the others listed below, write to our advertising department, 987 King Street, Wilmington, Delaware.

- Scientific Quarry Blasting
- Hercoblasting
- Modern Road Building
- Dynamite: the New Aladdin's Lamp
- Conquering the Earth
- Eliminating Waste in Blasting
- Shot Firing by Electricity
- Hercules Galvanometers & Rheostats

HERCULES POWDER CO.

ALLENTOWN, PA.
BIRMINGHAM, ALA.
BUFFALO, N. Y.
CHATTANOOGA, TENN.
CHICAGO, ILL.
DENVER, COLO.
DULUTH, MINN.
HAZLETON, PA.
HUNTINGTON, W. VA.
JOPLIN, MO.
LOS ANGELES, CALIF.
LOUISVILLE, KY.
NEW YORK CITY
NORRISTOWN, PA.
PITTSBURG, KAN.
PITTSBURGH, PA.
POTTSVILLE, PA.
ST. LOUIS, MO.
SALT LAKE CITY, UTAH
SAN FRANCISCO, CALIF.
WILKES-BARRE, PA.
WILMINGTON, DEL.

The Bucyrus 50-B Diesel shovel going through one of the heavy rock cuts. W. A. Bechtel's contract involved about 150,000 cubic yards of this class of material.

General View of Bechtel's work showing the Southern Pacific Company's new "Y" near the new crossing of the Gila River. The line running off into the background is the main line, running practically due south to Picacho on the present main line of the Southern Pacific. In the middle distance will be seen the new bridge across the Gila River which is being constructed by the Southern Pacific Company's forces. The line running off to the left is a six-mile branch under construction to Florence. The partially completed fill in the foreground is the third part of the "Y".